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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/686,850

10/16/2003

Xingwei Wu

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02/27/2006

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EXAMINER

ROY, SIKHA

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/686,850

Applicant(s)

WU ET AL.

Examiner

Sikha Roy

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-53 is/are pending in the application.
- 4a) Of the above claim(s) 54-63 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-41, 44, 46, 48, 49, 52 and 53 is/are rejected.
- 7) ☒ Claim(s) 15, 42, 43, 45, 47, 50 and 51 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0304, 0504, 1104.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

The Preliminary Amendment, filed on October 16, 2003 has been entered and is acknowledged by the Examiner.

Election/Restrictions

Applicant's election without traverse of Group I, claims 1-53 in the reply filed on November 7, 2005 is acknowledged. Claims 54-63 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II, there being no allowable generic or linking claim.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims.

Therefore, the 'reflecting layer' as claimed in claims 6,7, 48 must be shown or the feature(s) canceled from the claims.

The 'optical filter' as claimed in claims 8,9 and 49 must be shown or the feature(s) canceled from the claims.

The 'photoluminescent phosphor layer adhered to outer surface of cover plate and the phosphor layer coated with transparent passivating layer' as claimed in claim 27 must be shown or the feature(s) canceled from the claim.

The 'thin optically transparent barrier layer' as claimed in claim 29 must be shown or the feature(s) canceled from the claim.

Regarding claims 50, 51 'a transparent cover plate disposed on optically transparent sheet such that an air gap is formed between the optically transparent sheet and the transparent cover plate' must be shown or the feature(s) canceled from the claims.

The 'at least one other photoluminescent phosphor layer associated with at least one each photoluminescent phosphor layer' as claimed in claims 52, 53 must be shown or the feature(s) canceled from the claims.

No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1- 5,8 – 11,16,18, 19, 25, 28 - 41,46 and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 00/70917 to Wu et al. (for citing disclosure of claim limitations, reference is being made from corresponding U.S. Patent 6,771,019 to Wu et al.)

Regarding claim 1 Wu discloses (Fig. 6 column 18 lines 26-58, column 19 lines 41-46, column 20 lines 6-15) a pixel substructure (patterned phosphor structure) 30 for a thick film dielectric electroluminescent display comprising at least two sub-pixels 30a, 30b, each sub-pixel comprising a strontium sulfide blue light emitting electroluminescent inorganic phosphor and at least one photoluminescent phosphor (red phosphor) 30a associated with the sub-pixel. It is inherent that the other photoluminescent phosphor absorbs the blue light emitted by the electroluminescent phosphor disposed below and emits a different (red) color.

Regarding claim 2 Wu discloses (Fig. 6) the sub-structure 30 comprises two sub-pixels 30a, 30b and one photoluminescent phosphor layer.

Regarding claim 3 Wu discloses (Fig. 6 column 19 lines 41-46) the substructure comprises three sub-pixels (corresponding to three column electrodes 24) and a first and second (red and green) photoluminescent phosphor layers (zinc sulfide phosphors), the first photoluminescent phosphor layer emits a colored light (red) other than blue light and the second photoluminescent phosphor layer emits a color (green) other than blue light and the colored light (red) from the first photoluminescent phosphor layer.

Regarding claim 4 Wu discloses (Fig. 6 column 20 lines 28-32) each sub-pixel comprising a viewing side electrode 24 associated with the blue electroluminescent inorganic phosphor and each photoluminescent phosphor layer.

Regarding claim 5 Wu discloses (Fig. 6) the pixel-sub-structure comprises a plurality of photoluminescent phosphor layers, each photoluminescent phosphor being associated with a different one of the sub-pixel.

Regarding claims 8 and 9 Wu discloses (Fig.2 column 10 lines 31-34, column 13 lines 1-5) the pixel sub-structure comprising bandpass color filters 25a, 25b disposed over the surface of the photoluminescent phosphor layer 30a, 30b, 30c for achieving self-consistent optimization of luminosity, color coordinates and absorbing ambient light of color other than the one passing through including blue.

Regarding claim 10 Wu discloses the pixel-substructure comprising three sub-pixels of red, green and blue colors.

Regarding claim 11 Wu discloses the blue light emitting electroluminescent inorganic phosphor is blue emitting alkaline earth sulfide (SrS:Ce).

Regarding claims 16, 18 and 19 Wu discloses (column 5 lines 40-51, column 31 lines 12-20) the photoluminescent phosphor comprising inorganic photoluminescent powder of rare earth activated alkaline earth sulfides (ZnS:Mn covered with a thin hafnia injection layer and SrS: Ce for red and green photoluminescent phosphors).

Regarding claim 25 Wu discloses (Fig. 6 column 20 lines 28-32) one thin dielectric layer 28 is on the surface of the blue light emitting electroluminescent inorganic phosphor layer.

Regarding claim 28 Wu discloses (Fig. 6) each photoluminescent phosphor layer (patterned phosphor layers 30) is disposed on the viewing side electrode 24 of respective sub-pixels.

Regarding claim 29 Wu discloses (Fig. 6 column 13 lines 16-20) each photoluminescent phosphor layer is disposed on an optically transparent barrier diffusion layer 26 disposed on the viewing side electrode 24.

Regarding claim 30 Wu discloses (column 13 lines 37,38) the thickness of the phosphor layer is between 0.2 and 2.5 microns.

Regarding claim 31 Wu discloses all the limitations same as those of claim 1 for pixel sub-structure for a thick film dielectric electric electroluminescent display and additionally Wu discloses (Fig. 10) pixels comprising thick film dielectric layer 28.

Claims 32,33,34 and 35 essentially recite the same limitations of claims 2,3,4,5 respectively and hence are rejected for the same reason (see rejections of claims 2-5).

Regarding claim 36 Wu discloses the thick film dielectric electroluminescent display comprising plurality of photoluminescent phosphor layers 30 each one associated with different one of the viewing electrodes 24.

Regarding claims 37 and 38 Wu discloses each sub-pixel comprising a viewing electrode associated with blue light emitting electroluminescent phosphor layer .

Regarding claim 39 Wu discloses (Fig. 1 column 12 lines 25-40) the display comprising in sequence a substrate 12, a row electrode 14, thick film dielectric layer 18 and pixel substructure.

Regarding claim 40 Wu discloses the same limitations for method of making pixel sub-structure as of claim 1 and hence is rejected for the same reason.

Regarding claim 41 Wu discloses the pixel sub-structure comprising three sub-pixels and disposing first photoluminescent layer (red phosphor) over one sub-pixel emitting blue light such that the photoluminescent layer absorbs blue light and emits different colored light. Wu further discloses disposing second photoluminescent layer (green phosphor) on blue emitting sub-pixel such that the second photoluminescent layer absorbs blue light and emits different colored light.

Regarding claim 46 Wu discloses the method of making the pixel sub-structure comprising coating the phosphor with optically transparent passivating (dielectric barrier diffusion layer) layer.

Regarding claim 49 Wu discloses disposing one optical filter 25a over the photoluminescent layer such that the filter absorbs ambient light including blue light.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6, 7 and 48 are rejected under 35 U.S.C. 103(a) as being obvious over WO 00/70917 to Wu et al. and further in view of U.S. Patent 6,469,435 to Seibold et al.

Regarding claim 6 Wu does not disclose explicitly a reflecting layer associated with photoluminescent phosphor layer.

Seibold in pertinent art discloses (Fig. 1c column 4 lines 56-61) a reflective layer 62 under the phosphor layer 63. It is noted that the reflective layer increases the luminosity of light transmitted.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include a reflecting layer as taught by Seibold associated with one photoluminescent layer of Wu for increasing the luminosity of transmitted light.

Regarding claim 7 Wu and Seibold discloses a reflecting layer disposed on one surface of the photoluminescent layer.

Claim 48 essentially recite the same limitation of claim 7 for the method of making the pixel sub-structure and hence is rejected for the same reason.

Claims 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/70917 to Wu et al. as applied to claim 1 above, and further in view of U.S. Patent Application Publication 2002/0122895 to Cheong et al.

Regarding claim 12 Wu does not exemplify the blue emitting rare earth activated alkaline earth sulfide being selected from the group consisting of rare earth activated alkaline earth thioaluminates, rare earth activated alkaline earth thiooxyaluminates, rare earth activated alkaline earth thiogallates.

Cheong in the same field of endeavor discloses (section [0008]) blue phosphor material including europium activated barium thioaluminate. Cheong discloses this phosphor provides excellent blue color coordinates and higher luminance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to substitute rare earth activated alkaline earth sulfide of Wu by europium activated barium thioaluminate as taught by Cheong for providing excellent blue color coordinates and higher luminance.

Regarding claim 13 Cheong discloses the blue emitting rare earth activated alkaline earth sulfide is europium activated barium thioaluminate.

Regarding claim 14 Cheong discloses the blue phosphor film with relatively high energy conversion efficiency with CIE color coordinates $x=0.13$ and $y=0.10$.

Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/70917 to Wu et al. as applied to claim 1 above, and further in view of U.S. Patent 5,537,000 to Alivisatos et al.

Regarding claim 20 Wu is silent about the inorganic photoluminescent powder being inorganic semiconductor material.

Alivisatos in pertinent art of electroluminescent devices discloses (column 2 lines 14-39) electroluminescent device including light emitting inorganic semiconductor nanocrystals. Alivisatos further teaches these materials possess the capability of providing color change with easy fabrication.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to substitute for the inorganic photoluminescent powders of Wu with inorganic semiconductor nanocrystalline materials as taught by Alivisatos for providing photoluminescent material which possess the capability of providing color change with easy fabrication.

Regarding claims 21 - 23 Alivisatos discloses (column 6 lines 4-13) the semiconductor nanocrystalline material is selected from the group consisting of CdS, CdSe, CdTe, comprising crystals in a size range of about 10 to 100 Angstroms (column 3 lines 24-34).

Claims 17 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/70917 to Wu et al. and further in view of WO 99/16847 to Burns et al.

Regarding claim 17 Wu is silent about dyes included in the photoluminescent phosphor layer.

Burns in relevant art of fluorescent dye blends discloses (page 5 lines 13-25) use of dyes such as green, yellow light emitting dye which absorbs light at a first wavelength and emits a second wavelength which is longer than the first wavelength. Burns further teaches these dyes add hue and chroma to the color of light emitted.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include green, yellow light emitting dyes in the photoluminescent layer of Wu as taught by Burns to provide emission of light with longer wavelength and desired hue and chroma.

Regarding claim 24 Burns discloses the polymer matrix can be PMMA.

Claims 26 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/70917 to Wu et al.

Wu discloses (column 32 lines 1-8) a transparent glass cover plate disposed on the pixel structure with photoluminescent phosphor.

Regarding claim 26 Wu discloses the claimed invention except the photoluminescent phosphor adhered to the glass plate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the phosphor layer adhered to the cover plate of Wu instead of adhered to the viewing electrode since it has been held that rearranging layers of invention involves only routine skill in the art.

Claim 44 recites the same limitation as claim 26 and hence is rejected for the same reason.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/70917 to Wu et al. and further in view of U.S. Patent 5,909,081 to Eida et al.

Regarding claim 27 Wu discloses the claimed invention except for the photoluminescent phosphor adhered to the outer surface of the cover plate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the phosphor layer adhered to the cover plate of Wu instead of adhered to the viewing electrode since it has been held that rearranging layers of invention involves only routine skill in the art.

Wu is silent about at least one phosphor layer coated with optically transparent passivating layer.

Eida in pertinent art of multicolor emission display discloses (Fig. 2 column 25 lines 25-40) phosphor layer 3 disposed on the outer surface of the substrate 4 and a transparent passivating layer disposed on the phosphor layer. This passivating layer acts as protecting layer preventing deterioration of the phosphor.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include a passivating layer disposed on the photoluminescent phosphor adhered outside the cover plate of Wu as taught by Eida for preventing exposure with outside and hence any deterioration of the phosphor.

Claims 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/70917 to Wu et al. and further in view of U.S. Patent 6,608,439 to Sokolik et al.

Regarding claims 52 and 53 Wu is silent about at least one other photoluminescent phosphor layer associated with at least one photoluminescent phosphor layer in a sub-pixel.

Sokolik in pertinent art discloses (column 6 lines 61 through column 7 line 6) pixel element comprising one photoluminescent phosphor (at least one red, green or blue) associated with one photoluminescent phosphor of semiconductor nanocrystals. It is noted that this configuration provides desired color emitting from the pixel.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include at least one other photoluminescent phosphor layer associated with one photoluminescent phosphor layer of Wu as suggested by Sokolik for providing desired color emitting from the sub-pixel.

Allowable Subject Matter

Claims 15, 42,43,45,47,50 and 51 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 15 the prior art of record neither teaches nor suggests a pixel sub-structure having all the limitations as claimed and particularly the photoluminescent

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phosphor layer being insulating material with band gap energy less than that of the blue light emitting photon.

Regarding claim 42 the prior art of record neither teaches nor suggests a method of making a pixel sub-structure with the limitations as claimed and particularly disposing viewing electrodes over blue light-emitting inorganic phosphor layer and then disposing photoluminescent phosphor layer over the viewing electrode.

Claims 43,45 and 47 would be allowable for the same reason because of their dependency status from claim 42.

Regarding claims 50 and 51 the prior art of record neither teaches nor suggests a pixel sub-structure with the limitations as claimed and particularly a transparent cover plate disposed over the optically transparent sheet such that an air gap is formed between the optically transparent sheet and the optically transparent cover plate with one photoluminescent phosphor layer in between.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sikha Roy

Sikha Roy
Patent Examiner
Art Unit 2879